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STATUS OF CLAIMS:

Claims 1-24 are pending herein. Support for the amendments to claim 1 can be found throughout the specification. See, e.g., Figs. 2A-2B and 3A-3E. With regard to the etch stop layer, see, e.g., paragraphs 0009, 0022, 0037 and 0049 of the specification.

With regard to plasma assisted CVD in claim 24, see, e.g., paragraph 0031 of the specification.

Hence, no new matter is added.

REMARKS

A. Rejection of Claims 1, 2, 4-7, 9 and 10 under 35 U.S.C. 102

Claims 1, 2, 4-7, 9 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. 6,168,726 (Li). Applicant respectfully traverses this rejection and its supporting remarks.

For example, independent claim 1 is directed to a method of etching a structure that comprises a first layer of undoped silicon oxide or F-doped silicon oxide and a second layer of C,H-doped silicon oxide over the first layer. The structure is etched in a plasma-etching step, which is conducted using a plasma source gas that comprises nitrogen atoms and fluorine atoms, and which selectively etches the second layer of C,H-doped silicon oxide relative to the first layer of undoped silicon oxide or F-doped silicon oxide, thereby avoiding the need for an intervening etch stop layer between the first and second dielectric layers.

According to the Office Action, "Li describes a method for etching a dielectric layer comprising: providing a structure comprising a dielectric layer of TEOS oxide (claimed undoped silicon oxide) and a layer of oxidized organo-silane (claimed C,H Doped silicon oxide); etching the oxidized organo-silane with a plasma comprising nitrogen and fluorine atoms." (Citations omitted.)

A TEOS layer is described and illustrated in Fig. 2 of Li. However, in contrast to claim 1, this layer is a cap layer 102 and is thus provided *over*, rather than *under*, organo-silane layers 96 and 100. See col. 7, line 47 to col. 8, line 33. Moreover, the organo-silane layers 96, 100 of Fig. 2 are separated by an etch stop layer 98.

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For at least these reasons, it is respectfully submitted that independent claim 1 is patentable over Li. Claims 2, 4-7, 9 and 10, which depend directly or indirectly from claim 1, are also patentable over Li for at least the same reasons.

Accordingly, reconsideration and withdrawal of the outstanding rejection of claims 1, 2, 4-7, 9 and 10 under 35 U.S.C. 102(e) are respectfully requested.

B. Rejection of Claims 1-7, 9 and 10 under 35 U.S.C. 102

Claims 1-7, 9 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. 6,455,411 (Jiang). Applicant respectfully traverses this rejection and its supporting remarks.

For example, as noted above, independent claim 1 is directed to a method of etching a structure that comprises a first layer of undoped silicon oxide or F-doped silicon oxide and a second layer of C,H-doped silicon oxide over the first layer. The structure is etched in a plasma-etching step, which is conducted using a plasma source gas that comprises nitrogen atoms and fluorine atoms, and which selectively etches the second layer of C,H-doped silicon oxide relative to the first layer of undoped silicon oxide or F-doped silicon oxide, thereby avoiding the need for an intervening etch stop layer between the first and second dielectric layers.

According to the Office Action, "Jiang describes a method for etching a dielectric layer comprising: providing a structure comprising a TEOS oxide layer (claimed undoped silicon oxide) and a layer of oxidized organo-silicate glass (OSG) (claimed C,H Doped silicon oxide); etching the OSG layer with a plasma comprising C₅F₈/N₂/CO, N₂/CF₄ or NF₃. Since the etching is the same as that of the present invention, it would provide the same etching selectivity between the oxidized organo-silane and the dielectric layer as that of claims 1, 9 and 10." (Citations omitted.)

This interpretation of Jiang is disputed for at least the following reasons. Although a PETEOS layer is described within the description at col. 2, line 49 to col. 3, line 65 of Jiang, unlike the invention of claim 1, this layer (like the TEOS layer of Li above) is a cap layer. Hence this layer is provided *over*, rather than *under*, the other layers.

Moreover, unlike the invention of claim 1, the via and trench layers(s) 106/108 of Jiang are preferably formed of the same material. *Id.* See in particular col. 2, lines 64-67. The subsequent trench etch is performed either (a) by using a timed etch or (b) by providing an etch stop layer between the via and trench layers(s) 106/108. These measures indicate that no

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significant inter-layer selectivity exists between the trench and via layers 106/108 (e.g. because they are formed of the same material).

For at least these reasons, it is respectfully submitted that independent claim 1 is patentable over Jiang. Claims 2-7, 9 and 10, which depend directly or indirectly from claim 1, are also patentable over Jiang for at least the same reasons.

Accordingly, reconsideration and withdrawal of the outstanding rejection of claims 1-7, 9 and 10 under 35 U.S.C. 102(e) are respectfully requested.

C. Rejection of Claims 7 and 12-20, 22 and 23 under 35 U.S.C. 103(a)

Claims 7 and 12-20, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li or Jiang, as applied to claim 1 above, and further in view of U.S. 6,573,187 (Chen). Applicants respectfully traverse this rejection and its supporting remarks.

In order to establish a *prima facie* case of obviousness under 35 U.S.C. 103, (a) there must be some suggestion or motivation to modify/combine the references of record, and (b) there must be a reasonable expectation of success. See MPEP §2143. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *Id.* The mere fact that references *can* be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination or modification. MPEP 2143.01 (emphasis added) (citing *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)).

According to the Office Action: "Unlike the claimed invention, Li and Jiang do not describe a via dielectric layer of undoped or F-doped silicon oxide over an underlying layer and under the trench dielectric C,H doped silicon oxide...." The Office Action turns to Chen to make up for this deficiency in Li and Jiang, arguing that "Chen describes a method of forming a dual damascene structure having a via dielectric layer of undoped or F-doped silicon oxide 30 over an underlying layer and under the trench dielectric C, H doped silicon oxide 32 such as Black Diamond. It would have been obvious for one skilled in the art to form a dielectric structure in light of Chen because both Li and Jiang describes the C,H doped silicon oxide is part of a damascene dielectric stack and Chen teaches various equivalent dielectric stacks in order to form a dual damascene structure with a reasonable expectation of success..." (Citations omitted.)

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This position is respectfully traversed.

As opposed to the invention presently claimed in claims 1 and 10, in which structures are claimed which involve the specific combination of (a) a dielectric layer of C,H-doped silicon oxide, which is provided over (b) a dielectric layer of undoped silicon oxide or F-doped silicon oxide, Chen merely teaches that the dielectric layers 30 and 32 can contain "any suitable dielectric material such as SiO₂, Fluorine doped SiO₂, USG, FLARE, SILK or Black Diamond™ or any other suitable low-k dielectric material." See, e.g., col. 4, lines 28-35. Hence, this portion of Chen teaches nothing more than the fact that the two dielectric layers can be formed from *any* suitable low-k material.

It is true that Chen states that "due to the difference in etch rate between the two layers of dielectric, the trench of the dual damascene structure is etched without further affecting the via etch in the lower layer of dielectric." However, this vague disclosure falls far short of teaching the desirability of providing a structure comprising a C,H doped silicon oxide layer over an undoped or F-doped silicon oxide layer as presently claimed in claims 1 and 10.

Nor is there any teaching in Chen that such a structure is to be etched using a plasma source gas that comprises nitrogen atoms and fluorine atoms, such that the layer of C,H-doped silicon oxide is selectively etched relative to the layer of undoped silicon oxide or F-doped silicon oxide. In fact Chen does not appear to teach anything regarding the etching chemistry used.

Turning to Li, the Office Action states that Li describes an etching process that uses a plasma comprising nitrogen and fluorine atoms and more particularly that uses etching gases that comprise N₂ and CF₄, citing col. 12, line 66 to col. 13, line 13 of Li in support of this proposition. However, this etching process is clearly described for use *with a layer having an underlying nitride etch stop layer* (col. 12, lines 49-56). Accordingly, the etching chemistry of Li has nothing to do with an etching process like that required in Chen.

Similarly, regarding Jiang, the Office Action states that Jiang describes an etching process, which uses a "plasma comprising C5F8/N2/CO, N2/CF4 or NF3 (col. 3, line 24, and lines 46-50)." However, the etching chemistry at the cited line 24 is directed to a via etch process in which via and trench layer(s) 106/108 is(are) etched. The etching chemistry described at lines 46-50, on the other hand, is used in conjunction with either (a) a timed etch or (b) an etch involving an etch stop layer between the via and trench layers(s) 106/108. See col. 3, lines 38-

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44. Hence, as with Li, the etching chemistry of Jiang has nothing to do with an etching process, like that required in Chen.

For at least these reasons, it is respectfully submitted that independent claims 1 and 12 are unobvious over Li, Jiang and Chen.

Claims 7, 13-20, 22 and 23, which depend directly or indirectly from either claim 1 or claim 12, are also unobvious over Li, Jiang and Chen for at least the same reasons.

Accordingly, reconsideration and withdrawal of the outstanding rejection of claims 7, 12-20, 22 and 23 under 35 U.S.C. 103(a) are respectfully requested.

C. Rejection of Claims 11 and 21 under 35 U.S.C. 103(a)

Claims 11 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li or Jiang and further in view of U.S. Patent No. 6,194,128 (Tao). Applicants respectfully traverse this rejection and its supporting remarks.

As indicated above, claims 1 and 12 are patentable over Li and Jiang. Tao, which is cited as allegedly providing motivation to use a MERIE system, does not make up for the above-noted deficiencies in Li and Jiang.

For at least this reason, it is respectfully submitted that independent claims 1 and 12 are patentable over Li, Jiang and Tao. Claims 11 and 21, which depend from claims 1 and 12, are therefore patentable over Li, Jiang and Tao for at least the same reasons.

Accordingly, reconsideration and withdrawal of the outstanding rejection of claims 11 and 21 under 35 U.S.C. 103(a) are respectfully requested.

CONCLUSION

Applicants submit that all pending claims of the present invention are in condition for allowance, early notification of which is earnestly solicited. Should the Examiner be of the view that an interview would expedite consideration of this Amendment or of the application at large, request is made that the Examiner telephone the Applicant's attorney at (703) 433-0510 in order that any outstanding issues be resolved.

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FEES

The Commissioner is authorized to charge any fees due and owing in respect to this amendment to deposit account number 50-1047.

Respectfully submitted,



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